National Renewable Energy Laboratory's Village Power Program

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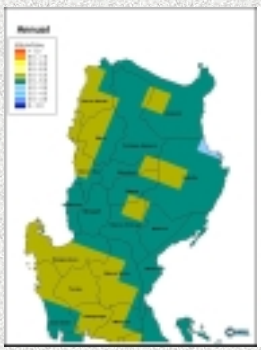
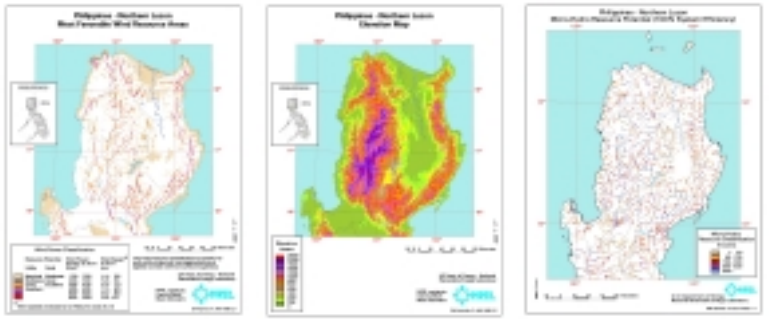
Pilot Projects

Russia: Assists the Russian Ministry of Fuel and Energy in the deployment of 21 wind/diesel systems in Russia's Northern Territories and conducts feasibility studies for construction of a 1-MW demonstration biomass power plant in the Arkhangelsk Region.
Mexico: Provides technical assistance to wind projects, including village electrification, eco-tourism, and water pumping projects.
Chile: Provides full range of assistance on small wind electrification projects, including resource assessment, training, and pilot project development and installation.
Brazil: Takes a multifaceted approach to renewable energy implementation and commercialization, including solar home lighting pilot projects and two large hybrid wind/PV/diesel pilot projects.
China: Works with in-country partners on renewable energy projects and training, including resource assessment, pilot project and O&M plans, project identification, financial analysis, and pilot project implementation.
Ghana: Supports the development of the Rural Energy Services Project (RESPRO) funded by the UNDP/GEF in the Mamprusi district.

Resource Assessment

In the Philippines, NREL has completed solar, wind, and hydro resource assessments for the entire country. Shown here are the results for northern Luzon. As with the shaded relief topographic map, the renewable energy resource information is represented on a geographic information system to further facilitation of national energy planning.





Applications Development/Testing

Approach:
- Important village power applications are identified and integrated renewable energy solutions are designed and developed to power those applications.
- Commercial systems are tested to ensure compatibility with specific village power applications (e.g., ice making and water desalination).

Example:
A diesel power plant located on the northwest coast of Alaska with a mostly Inupiat Eskimo population of ~160 and an average load of 60-70kW. The current power system includes 3 manually controlled diesel gensets with a total installed capacity of 365 kW. The new hybrid system will apply automatic controls to the diesels and install two 6-kW wind turbines, a 130 AC short-term battery storage unit with a 156-KVA rotary converter, and a resistive heat loop to provide central heating to the local school and power plant. The system is designed to reduce diesel and heating fuel consumption by over a 50%.

Wind/diesel hybrid system in Wales, Alaska, U.S.A

Training

Russia:
- Trained analysts in hybrid systems
- On-site training of system installation/commissioning/monitoring

Mexico:
- Workshops on wind water pumping and village hybrid systems
- Installation training on water pumping, and eco-tourism wind systems

Chile:
- On-site training of utility engineers and villagers on hybrid systems
- Training of rural electrification engineers in analysis of options

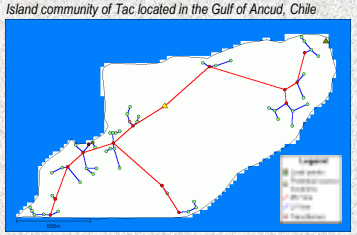
China:
- Training of analysts on hybrid systems and resource assessment

Brazil:
- Training of analysts and middle managers on wind hybrid systems analysis
- In-country workshops on wind and PV applications

Philippines:
- Trained SPUG and private sector analysts in hybrid systems.

Andrew McAllister of NRECA provides a training course on renewable energy to the villagers of Isla Nahuel Huapi as part of the village training program in Chile.

Island community of Tac located in the Gulf of Ancud, Chile



ViPOR output for Isla Tac displays optimal layout for distribution system.

Analysis and Model Development

NREL has developed a suite of Village Power analytical models:

- Hybrid2 is a detailed engineering model for technical and economic performance of hybrid systems.
- HOMER is an optimization model for quick and easy screening, economic comparisons, and conceptual design of hybrid systems. HOMER is capable of optimizing hybrid power systems composed of one or more solar, wind, battery and diesel power systems. HOMER can synthesize resource data and perform extensive sensitivity analyses with a variety of graphical outputs. Biomass, micro-hydro and a GIS interface are under development.
- ViPOR is a grid optimization model that lays out village mini-grids and uses HOMER to compare mini-grids to individual household systems.

Renewables for Sustainable Village Power (RSVP) Home Page

Renewables for Sustainable Village Power (RSVP) Web Site

http://www.rsvp.nrel.gov

Provides information on:
- NREL's Village Power Program
- Village Power lessons learned
- Village Power project briefs
- Village Power bibliography
- Village Power conferences

Provides links to:
- Village power analytical models (i.e. Hybrid2, HOMER, ViPOR)
- Consultants/developers, equipment/system suppliers contact information
- Financial institutions, non-governmental organizations, regional resources, trade associations, and more
- Updated calendar of events.

Provides a database of village power projects with information from more than 140 international village power projects from over 20 countries. Projects can be searched by technology (e.g., wind and photovoltaics), application (e.g., lights and water), sector (e.g. residential and commercial), and geographical region.